Southern California Edison Unleashes the Power of HANA

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Southern California Edison
Agenda

SAP HANA
- Logical Architecture
- SCE Business Drivers
- SAP’s HANA Strategic Roadmap

HANA Project at SCE
- Project Plan and Scope
- BW HANA Sizing
- Near Line Storage
- BW HANA Stabilization
- BW HANA Implementation Results
  - Data Loading
  - Performance Results
  - SCE BI Journey
- Key Benefits
- BW HANA Total Cost of Ownership
- HANA Applications
- Partners
SAP HANA – Architecture at Southern California Edison

BW / HANA Logical Architecture Production

ETL
- PI
- Data Services
  - Upgrade to 4.0
  - LINUX 6.2 Virtual
  - HA Linux Cluster
- CLA
  - BW
    - AIX Virtual
    - IP / BCS
    - Upgraded to BW 7.3
    - HA/DR AIX Virtual
- BW DB HANA
  - New Revision 50
  - Appliance / Local HA
  - DR Remote Restore
  - Backup to SAN
- NLS
  - New Version PBS NLS IQ 15.x
  - LINUX 6.2 Physical
  - HA/DR Linux Cluster

Application
- BW
- AIX Virtual
- IP / BCS
- Upgraded to BW 7.3
- HA/DR AIX Virtual
- BW DB HANA
- New Revision 50
- Appliance / Local HA
- DR Remote Restore
- Backup to SAN
- NLS
- New Version PBS NLS IQ 15.x
- LINUX 6.2 Physical
- HA/DR Linux Cluster

Presentation
- BOE 4.0
- CMS
  - LINUX 6.2 Virtual
  - Upgrade to 4.0
  - HA Linux Cluster
  - Explorer
    - Upgraded to 4.0
  - Linux 5.8 Virtual
  - HA Linux Cluster
- SUP SERVER
  - Windows Virtual
- MOBI 4.0
  - Windows Virtual
- Tomcat
  - LINUX 6.2 Virtual
  - HA Linux Cluster

Tools
- SAS 4.3
- AIX Virtual
- BW BEx Analyzer
  - 7.2
- BOE Webi
  - 4.0
- BOE Explorer
  - 4.0
- BOE Dashboard Designer
  - 4.0
- BOE Crystal Designer
  - 2011

Source
- CRM other SAP
  - Extractors (RFC)
- Non-SAP
- ECC
  - Extractors (RFC)
Southern California Edison Business Drivers

**Next Generation Analytics**

- Faster analytics
- Modeling flexibility
- Near real-time data replication
- Calculation engine and built-in functions
- Big Data footprint
- New applications—potential examples:
  - Smart meter analytics
  - Power outage management
  - Predictive analytics
  - Specific performance enhancements

**Operational Improvement**

- Faster reporting
- Faster data loading
- Lower TCO
- Reduced maintenance costs
- Reduced development costs

Standalone HANA

BW HANA
SAP HANA – SAP’s Strategic Roadmap

**…..2010**

- SAP BW
  - Legacy Database

**2011**

- SAP BW & BWA
  - Legacy Database with BW Accelerator

**2012**

- SAP BW HANA
  - SA HANA & BW HANA

**2013…..**

- SAP HANA
  - Integrated / Federated HANA

**Supporting Cast:**

- BOBJ 3.1 SP1
- BOBJ 3.1 SP2
- BOBJ 4.0 SP4
- Add:
  - Visual Intelligence
  - Analysis for Office
  - Predictive Analytics
  - BPC
  - BOBJ 4.1, 4.2

- SAS
- SAS
- SAS
- Near-line Storage
- Mobility
- Data Federator
- Smart Data
### SCE HANA – Production Implementation

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#### GOALS

**BW HANA**
- Migrate all of BW Legacy DB into BW HANA
- Incorporate BCS and IP into BW HANA
- Reduce nightly batch loading
- Improve reporting performance
- Migrate the Enterprise BusinessObjects system from 3.1 to 4.0 (FP 4)

**Standalone HANA**
- Create the ability to handle “Big Data” analytics with SA HANA
- Leverage built-in calculation engines
- Create one or more new applications in Standalone HANA
- Implement SLT Real-time replication

**Both HANA Systems**
- Implement Mobility for BOBJ
- Implement Explorer
- Implement Data Federation
**BW HANA Sizing**

- **BW DB Production**
  - (22 TB - uncompressed);
  - Full landscape (80 TB)

- **After removal of PSA, Change Log, DB Overhead, and Misc Files**
  - (3.7 TB)

- **HANA Compression of 4.8:1**
  - (770 GB)

- **Removal of Some Cubes & Master Data**
  - (693 GB)

- **Apply Near-line Storage – Final Size of BW HANA after Go-live**
  - (525 GB)

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### Object Type Sizing

<table>
<thead>
<tr>
<th>Object Type</th>
<th>Starting Point</th>
<th>Clean up Objects</th>
<th>Remove PSA</th>
<th>Remove Change Log</th>
<th>Remove DB Overhead</th>
<th>HANA Compression</th>
<th>Remove Some Cubes</th>
<th>NLS</th>
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<td>0</td>
<td>0</td>
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<td>952</td>
<td>952</td>
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<td>Master Data</td>
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<td>498</td>
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<td><strong>3710</strong></td>
<td><strong>770</strong></td>
<td><strong>693</strong></td>
<td><strong>525</strong></td>
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</table>

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![Graph showing BW HANA sizing](image-url)
BW HANA with Near-line Storage

User requests current data only

User requests current and historical data

BW OLAP ENGINE

BW Structure changes Synch

Monthly Archival

8 CPU, 96 GB RAM, 600 GB SAN

Tape Backup

Geographic Failover

SAP BW HANA

DR

SAP BW HANA

SAP BW HANA

PBS NLS

PBS NLS

DR

User requests current data only

User requests current and historical data

8 CPU, 96 GB RAM, 600 GB SAN

Tape Backup

Geographic Failover

SAP BW HANA

SAP BW HANA

PBS NLS

PBS NLS

DR

DR
BW HANA with Near-line Storage

- Initial savings of 170 GB (25%)
- Ongoing yearly savings of reduced growth on HANA (22% yearly)
  - Reduces SAN cost
  - Reduces SAP License cost
  - Reduces HANA hardware footprint
  - Yearly growth on BW reduced from 34% to 12%
- Significantly improved TCO (2.5 years pay back versus “never paying back”)
- Seamless queries that are transparent to end users
- Good query performance for NLS data retrieval
- NLS serves as a real-time data retrieval system and archival system

NLS Solution: Dolphin (PBS Software) – SAP Partner
HANA Stabilization Issues – Nightly Data Loading

Data Availability Percentage
(Since HANA Go-Live)

Note: Service Level Agreement for Data Loading is......................... 95%
The 2012 average for BW on the legacy Data Base was.......... 98%
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**BW HANA Performance Results**

1. **Data Compression (column store)**
   - HANA Legacy DB
   - Legacy DB
   - Cube
   - DSO
   - Master Data
   - 4.8 x

2. **Data Loading - Full**
   - Legacy
   - HANA
   - DSO to Cube
   - DSO to DSO
   - DSO Activation
   - 5.2 x

3. **Data Loading - Delta**
   - Legacy
   - HANA
   - DSO to Cube
   - DSO to DSO
   - DSO Activation
   - 3.2 x

4. **Response Time**
   - BW with BWA
   - BW HANA Cube
   - BW HANA DSO
   - 5 x

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Native HANA Performance Results

**DB Compression**

- HANA DB
- Legacy DB

![Diagram showing HANA DB and Legacy DB with a comparison factor of 7X]

**Data Loading**

- **37 GB in 7 Mins**
  - Using Bulk Loader
- **4 MB in 1 Second**
  - Using Smart Data

**Response Time**

- **BOBJ**
  - BW with BWA
  - BW HANA Cube
  - BW HANA DSO
  - SA HANA

![Bar graph showing response times with a comparison factor of 50X]

- **ABAP Accelerator**
  - ABAP
  - HANA

![Bar graph showing response times with a comparison factor of 41X]

- **SQL**
  - Legacy
  - HANA

![Bar graph showing response times with a comparison factor of 15X]
The Southern California Edison Business Intelligence Journey

**Operational Improvement** *(BW HANA)*

<table>
<thead>
<tr>
<th>BW  2007 (1)</th>
<th>BW-BWA 2009 (2)</th>
<th>BW-BWA 2011 (3)</th>
<th>BW HANA 2012 (4)</th>
<th>Standalone HANA 2012 (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOBJ 3.1, SP1</td>
<td>BOBJ 3.1, SP2</td>
<td>BOBJ 3.1, SP4</td>
<td>BW HANA</td>
<td>BOBJ 4.0, SP4</td>
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<tr>
<td>90 sec</td>
<td>40 sec</td>
<td>35 sec</td>
<td>7 sec</td>
<td>0.7 sec</td>
</tr>
</tbody>
</table>

**Analytics** *(SA HANA)*

**Report Performance**

![Report Performance Chart]

Performance Improvements

- Reports
### SAP HANA Project Key Benefits

<table>
<thead>
<tr>
<th>Capability</th>
<th>Benefit</th>
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<tbody>
<tr>
<td>Faster Report Performance</td>
<td>5x -- BW; 50x – SA HANA, ABAP Accel; 15x – SQL) Improve resource effectiveness</td>
</tr>
<tr>
<td>HANA</td>
<td></td>
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<tr>
<td>Faster Data Loading</td>
<td>3x – BW; 15x– Stand Alone HANA Nightly loads will no longer miss the morning deadline</td>
</tr>
<tr>
<td>HANA</td>
<td></td>
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<tr>
<td>Functional Enhancements</td>
<td>Easier-to-use Reporting and Data Loading</td>
</tr>
<tr>
<td>BusinessObjects and Data Services</td>
<td>More capability and more stable</td>
</tr>
<tr>
<td>Mobility</td>
<td>Anytime-Anywhere Access Key results on iPad, iPhone, Blackberry (WiFi, 3G, 4G)</td>
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<tr>
<td>Mobi</td>
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<tr>
<td>Interactive Analytics</td>
<td>Fast Real-time Analysis Different views available in seconds</td>
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<tr>
<td>Explorer</td>
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<tr>
<td>Ad Hoc &amp; Prototyping Environment</td>
<td>Faster and Less-costly Report Development Draft report formats reviewed while defining requirements</td>
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<tr>
<td>Data Federator / Smart Data</td>
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<tr>
<td>Real-time Data Replication</td>
<td>Real-time Data Movement Transactional updates are moved in 0.2 second</td>
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<tr>
<td>SLT</td>
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<tr>
<td>Total Cost of Ownership (TCO)</td>
<td>Cost-effective BW HANA Payback is in 2.4 years based on cost data</td>
</tr>
<tr>
<td>HANA data compression, NLS, reduced hardware</td>
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<tr>
<td>Data Management</td>
<td>Significant Cost Savings Infrequently used offline data is seamlessly available. More costly HANA memory is conserved.</td>
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<tr>
<td>Near-line Storage (NLS)</td>
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</table>
## BW HANA – Total Cost of Ownership (TCO)

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<thead>
<tr>
<th>One-time Costs / Savings</th>
<th>Ongoing Costs / Savings</th>
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<tr>
<td>+ HANA software license</td>
<td>+ Software license</td>
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<tr>
<td>+ Near-line storage software and hardware</td>
<td>+ Growth software license</td>
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<tr>
<td>+ HANA hardware</td>
<td>+ Hardware maintenance</td>
</tr>
<tr>
<td>+ NetWeaver App Servers</td>
<td>+ Growth hardware purchases (SAN, servers)</td>
</tr>
<tr>
<td>+ BOBJ Servers</td>
<td>+ Growth HANA hardware purchases</td>
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<tr>
<td>- Potential BWA License Credit</td>
<td>- Labor maintenance</td>
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<tr>
<td>- Repurposed hardware (SAN, servers)</td>
<td>- Labor development</td>
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<td>+ costs - savings</td>
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</tbody>
</table>

**Cost**

![Graph showing the relationship between cost and time with a decrease in cost over time]
HANA Applications

• BW HANA
• Mixed Mode HANA
  • CRM
  • Explorer
• Standalone HANA
  • SLT and ABAP Accelerators
  • Storm Tracker
    • Standalone HANA APP with JAVA Widgets
• HANA as a Calculation Engine
How this works

• DB migration from legacy DB to HANA 1.0 SP 03 (with BW 7.3 SP5) – Upgrade and Migrate without re-implementing.
• HANA optimized DSOs and Cubes for better performance.

Business benefits

• Users experience faster response times for existing reports.
• Faster data loading.
• Reduced maintenance costs.
• Reduced development costs.
• Lower TCO.
Mixed-mode HANA: CRM

- SAP BW
  - Query
  - Virtual Provider
  - Transient Provider
  - Composite Provider
  - Masterdata

- HANA DB
  - HANA View(s)
  - SAP HANA Schema
  - SAP BW Schema
  - SQL Script
  - Data Services
  - Table(s)

- BOBJ
  - Joins Objects in BW HANA

- BW integrates SAP HANA tables in BW
Mixed-mode HANA: BO Explorer

How this works / Use Case

- Import DSO/Cubes into HANA DB as Analytical Views.
- Leverage BW roles as Analytical privileges.
- Build Information spaces on top of these models.
- Expose these models to BO Explorer.
HANA as SAP ERP Process Accelerator

How this works

- In-Memory Appliance serves as secondary database for SAP ERP scenarios.
- Data is replicated to HANA in real time for secondary storage.
- Application performance is accelerated since its reads data from HANA.
- User interface can be a standard SAP ERP ABAP report or new BOBJ reports.

Use Cases

- **CO Line Item Reporting**: Accelerated and enhanced CO line item reporting (Cost Centers, Actual and Plan)
- **CO Partner Object Reporting**: In Memory based CO Partner Object Reporting (Orders, Actual and Plan)
HANA Application – Storm Tracker

How this works

- HTML5 serves as the front end for the Storm Tracking Application. The javascript library is jQuery which is compatible with MS Sharepoint.
- SAP PI is the middleware that will be leveraged to perform validations against the backend systems.
- ECC is the system of record for HCM data and is used to validate.
- SCE standard reporting suite and will fulfill the real time reporting requirements.
- SAP HANA Plays a critical role hosting the application data and logic
- Data is exposed through ODATA

Use Cases

- A central repository that hosts all storm tracking related operational
- The tool will be used during any level of event or storm by staff involved in storm or electrical restoration efforts.
- A real-time dashboard is needed in order to provide a consolidated view of Storm Tracking data
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HANA as Calculation Engine – Utility Rate Calculator

How this works

• Online Rate Calculation hosted on SCE.com.
• Solution would be completely made online (On the Fly) using SAP HANA.
• Usage data from legacy DB is fetched during runtime using Smart Data in SAP HANA SP6 (less than 1 second)
• SAP HANA used as a supplement to the existing legacy DB to meet the business SLA (SQL is 15x faster on HANA).

Use Cases

• Currently legacy DB is capable of running a commercial rate customer with an average of 38 seconds in an online mode.
• The same scenario with SAP HANA has been tested at 2.5 seconds.
SCE’s Partner’s on the SCE HANA Project:

- Southern California Edison
- SAP
- Infosys
- Dolphin

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